



Intergenerational mobility and the rise and fall of inequality: Lessons from Latin America

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Abstract

Countries with high income inequality also show a strong association between parents' and children's economic well-being; i.e. low intergenerational mobility. This study is the first to test this relationship in a between-country within-country setup; using harmonized micro data from 18 Latin American countries, spanning multiple cohorts. It is shown that experiencing higher income inequality in childhood is associated with lower intergenerational mobility measured in adulthood. Following the same methodology, the influence of economic growth and public education is evaluated: both are positively, significantly, and substantially associated with intergenerational mobility.

Keywords Inequality · Intergenerational mobility · Equality of opportunity · Human capital · Growth · Development · Public education · Great gatsby curve · Latin America

1 Introduction

Contemporary egalitarian theories of justice, e.g. Rawls (1971) and Sen (1980), suggest that, from a normative perspective, the key to understanding whether it is worth caring more or less about income distribution within a society - i.e. about (in)equality of outcomes - is the evaluation of (in)equality of opportunities. Equality of opportunity is a long-studied subject and, for the most part, one of the primary goals of policy makers. The fundamental discussion in this respect concerns the distinction between inequality of outcomes resulting from *individual efforts*, and inequality of resources arising from *given circumstances* (Roemer 2000). Recently, the topic has been the subject of extensive debate, since empirical evidence shows that in countries where income inequality is high, there is also a strong association

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between parents' and children's economic well-being (i.e. low intergenerational mobility).¹ The graph visualizing this phenomenon across countries is the well-known *Great Gatsby Curve*.²

This negative relationship between income inequality and intergenerational mobility has previously been hypothesized by Becker and Tomes (1979) and Loury (1981), and subsequently in macroeconomic models of, among others, Galor and Zeira (1993), Owen and Weil (1998), and Maoz and Moav (1999) and Hassler et al. (2007). The presence of such a relationship would mean, in simple terms, that when inequality is high, the same families persist at the top or bottom of the income distribution over (two or more) generations. Hence, finding a clear link between an unequal distribution of income, low intergenerational mobility, and the persistence of economic inequality would probably be the strongest motivation, particularly for policy makers, for caring about income inequality.

However, most empirical studies on the relationship between income inequality and intergenerational mobility focus on comparisons between countries, which does not rule out the possibility that the association might merely be driven by cross-country heterogeneity, for instance in institutions. Only a few recent studies investigate this relationship, but restrict the analysis to a single country (e.g. Chetty et al. 2014a; Güell et al. 2018). Therefore, more research with comparable data on multiple countries and cohorts is crucial for the understanding of the interplay between income inequality and intergenerational mobility, as pointed out, for example, by Jäntti and Jenkins (2015).

The purpose of the present study is to deepen our understanding of the relationship between inequality and intergenerational mobility, by empirically analyzing harmonized survey data for 18 distinct countries, which span multiple cohorts. Its main contribution is to test whether a negative relationship exists in a between-country *and* within-country set up. The usual limitation when measuring intergenerational mobility with household survey data, that only information on educational attainment is available, is overcome by constructing a measure of individual relative educational position; this is identified as a better proxy for well-being across countries and over time.

The laboratory for this exercise is Latin America. An interesting fact is that while worldwide inequality has been consistently rising, and though Latin American countries followed this trend for some time, over the last decades many of them experienced a significant decrease in inequality (Gasparini et al. 2011a; Cord et al. 2013). At the same time, the region experienced a substantial increase in intergenerational mobility for people born in the 1980s when compared to their parents and grandparents (Neidhöfer et al. 2018a).

The main findings are as follows. Estimations performed on two different sources of harmonized household survey data confirm the link portrayed by the Great Gatsby Curve and hypothesized by economic theory: Individuals who experienced higher (lower) income inequality in childhood or adolescence – i.e. when parental investment in human capital is crucial – show significantly lower (higher) intergenerational mobility as adults. This negative relationship is mostly driven by the lower upward mobility of individuals at the bottom of the distribution and is robust to different specifications. One of the forces behind this

¹The concepts of equality of opportunity and social intergenerational mobility are very close. Brunori et al. (2013) find even a strong correlation between common indices of inequality of opportunity and measures of intergenerational mobility. For some viewpoints, and a discussion on similarities and differences of the two constructs, see Roemer (2004, 2012) and Corak (2013a).

²The *Great Gatsby Curve* was addressed by Alan Krueger as chairman of the council of economic advisers in a speech titled "The Rise and Consequences of Inequality in the United States" on January 12, 2012, at the Center for American Progress. The original analysis and a discussion can be found in Corak (2013a, b).

relationship turns out to be economic growth, which is positively associated with mobility. Furthermore, also public expenditures on education show the expected positive association with intergenerational mobility. All in all, the crucial importance of private and public investment in children's human capital is confirmed, with the latter being a channel to support higher intergenerational mobility. This last finding has far-reaching implications for public policies that aim to enhance equality of opportunity within a society.

The remainder of the paper is organized as follows. Section 2 reviews the literature on the relationship between inequality and intergenerational mobility, and explains the theoretical mechanisms behind this association. Section 3 describes the data and presents the applied measurements. Section 4 shows the main results. Section 5 concludes.

2 Inequality and intergenerational mobility: The State of the Art

The relationship between inequality and intergenerational mobility is of crucial importance for various dimensions of economic development. In the past, the subject has been analyzed in theoretical models, e.g. by Becker and Tomes (1979, 1986) and Loury (1981). The main intuition in these models is that *family endowments* inherited by children from their parents play a crucial role in the mechanisms underlying the intergenerational transmission of inequality. Rising income inequality between families translates into higher inequality of investment in children's human capital, and thus to lower upward mobility of children coming from poorer households. In subsequent contributions (e.g. Owen and Weil 1998; Maoz and Moav 1999; Galor and Zeira 1993; Hassler et al. 2007) an important weight is also attributed both to credit market constraints that limit private investment in human capital, and to public investment in human capital.

All of the aforementioned models are, essentially, built on the assumption that parents derive utility not only from their present consumption level, but also from the future utility of their children. Therefore, parents invest in the human capital of their children to raise their future income and, thus, utility. If the investment is exclusively private, budget constraints limit the investment choices of families and lead - particularly in the presence of credit market imperfections - to the persistence of inequality from one generation to the next. Poor parents are unable to invest in the human capital of their children, who are therefore unable to afford better income opportunities for themselves and to climb up the social ladder. Consequently, when income becomes more unequally distributed, inequality of investment in children's human capital rises, causing low intergenerational mobility, social stratification, and even higher income inequality in the following generation.³

Observing the dynamics of this process within a society, as a logical consequence of the mechanisms explained above, we would expect rising income inequality to cause lower intergenerational mobility. However, whereas the cross-country association between income inequality and intergenerational mobility has been investigated extensively (e.g. Aizer 2014;

³Empirically, the question of whether parental income and credit constraints are determinants of disparities in human capital investments is far from being resolved, as pointed out, for example, by Piketty (2000) and Black and Devereux (2011). The association might be even stronger if altruism and the propensity to invest in children's human capital are positively associated with social status. Other direct and indirect effects of certain parental background features play an important role, such as parental education and cognitive abilities (e.g. being able to support children in their educational career, and the informational advantage of the value of certain degrees on the labor market), as well as so-called network and neighborhood effects (e.g. Benabou 1996; Durlauf 1996). Genetic transmission of abilities might also be a significant channel, although it may be relatively weak in comparison with other family endowments (Black et al. 2015).

Andrews and Leigh 2009; Björklund and Jäntti 2012; Blanden 2013; Brunori et al. 2013; Checchi et al. 1999; Corak 2013a, b; Holter 2015; Jerrim and Macmillan 2015), within-country evidence on this matter is still rare. Chetty et al. (2014a) show that in the US, geographical areas with high inequality display low rates of mobility. This is confirmed by the analysis of Güell et al. (2018) for Italian provinces. In contrast, observing time trends, Chetty et al. (2014b) find that intergenerational mobility has not fallen in the US despite rising inequality, confirming earlier findings by Lee and Solon (2009). The authors explain this by noting that the rise in inequality in the US was mainly driven by top incomes (Piketty and Saez 2003), while mobility depends to a larger extent on “middle class” inequality (i.e. among the bottom 99 % of the income distribution).

Similar approaches to the one applied in the present study are recent analyses by Cingano (2014) using PIACC data, by Kerney and Levine (2016) on the association between inequality and the probability of dropping out from school in the US, and by Bloome (2015) for inter-state variation in the US using the PSID. While the first two confirm the negative relationship between inequality and intergenerational mobility, the latter finds no significant support for it. One of the very few studies analyzing cross-sectional inequality and intergenerational mobility trends in a developing country is the paper of Fan et al. (2015) on China. They find evidence for the existence of a Great Gatsby Curve within China.

Finally, what also needs to be taken into account is that the interplay between three institutions determines the degree of intergenerational mobility within a society (Corak 2013b). The first institution is the family, mainly due to the inheritance of endowments from parents to children through investments in human capital (e.g. determining quantity, quality, and pertinence of educational attainments), genetic transmission of abilities, and the passing down of certain values. For instance, concerning the last-mentioned point, Corneo and Neher (2013) find a positive association between income inequality and a stronger work ethic, which might lead to higher intergenerational mobility. The second institution is the market, since higher returns to investment in human capital might act as an incentive for families to invest more and, thus, raise mobility (Solon 2014). The third is the state, which provides public investment in human capital for families that otherwise could not afford an efficient level of investment due to budget constraints (Davies et al. 2005). Additionally, on this last point Ichino et al. (2011) argue that political institutions strongly influence the degree of status persistence, and are one of the main explanations for cross-country differences in mobility. Finally, another important aspect is the timing of the investment in human capital. As pointed out by Heckman and Mosso (2014), among others, investments are more effective at earlier ages. In any case, as various branches of research have shown, the role of parental background on children’s outcomes is important throughout various stages of life (Ermisch et al. 2012).

3 Data & measurement

3.1 Data

Studies on intergenerational mobility are both methodologically and conceptually constrained by the available data (see e.g. Björklund and Jäntti 2012; Jäntti and Jenkins 2015 for an overview). Ideally, the requirement for an empirical analysis of intergenerational mobility is the availability of valid measures (or good proxies) for permanent income of parents and children. For cross-country comparisons to be meaningful, the data must be as comparable as possible between countries.

Research on intergenerational mobility in developing countries faces a further complication. Since longitudinal data is an absolute rarity, there are only two ways to obtain information on the economic outcomes (e.g. educational attainment, occupation) of parents and children in cross-sectional household surveys. The first is to restrict the analysis to children and parents living in the same household. The second is to use information given in response to retrospective questions on parental characteristics. Estimates derived from the first approach are biased by the truncation and non-representativeness of the sample, because adult children who left the household due to marriage, college or for other reasons are not taken into account.⁴ The second alternative should, therefore, be more appropriate. However, not all surveys work with retrospective questions to obtain information on parental characteristics.

The data sources used in this study fulfill the required prerequisites. First, the public opinion survey *Latinobarometro* (*Latinobarometro* 2013), which since 1995 has recorded individual and household characteristics of a nationally representative sample of adult respondents in 18 Latin American countries, including questions about one's own and parental education (the latter since 1998). Second, a micro data set which pools several household surveys for 9 Latin American countries that include retrospective questions about the educational attainments of parents. While the *Latinobarometro* data is harmonized ex-ante, the data set which comprises different household surveys is harmonized ex-post. The countries included in the latter are Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, and Peru. The samples comprise 120,166 (*Latinobarometro*) and 390,404 (*Harmonized Household Surveys*) individuals who were born after 1970 and were at least 18 years old when the survey was conducted, with available information on their own and parental education.⁵ The number of observations by country is rather balanced in the *Latinobarometro*, ranging from 3,926 in the Dominican Republic (that was included in the *Latinobarometro* survey in 2004) to 8,035 in Mexico. In the second data set it varies from 2,360 observations in Nicaragua to 130,750 in Chile.⁶ A more detailed description of the samples is included in the [Online Appendix](#).

Information on income inequality is extracted from the *Socio-Economic Database for Latin America and the Caribbean* (SEDLAC 2014), which is the main source of information regarding inequality, poverty, and other labor market or social indicators for Latin America.⁷ The SEDLAC data relies on harmonized micro data from over 300 household surveys carried out in 24 Latin American and Caribbean countries, and represents more than 97 %

⁴Although intuitively the problem is clear enough, research on the actual degree of the bias is rare. Only recently, a study by Emran et al. (2017) has shown that the bias is severe on measures of mobility that do not take into account the variances of the dependent and independent variable, such as the intergenerational regression coefficient, and not as strong for normalized measurements, such as the standardized intergenerational correlation.

⁵The overall sample has been restricted to individuals born in 1970, since macro-data on inequality, growth, and public expenditures in Latin America is available from around 1970-1980. A priori, the analysis could be sensitive to the chosen age restriction of 18 because some individuals might not have yet completed their educational career at this age. A question on this that was included in the 2013 wave of the *Latinobarometro* survey shows that the mean age of completion of education in Latin America is 17.7, ranging from a mean age of approximately 15 in Honduras to approximately 20 in Brazil. Suitable robustness checks imposing different age restrictions (e.g. older than 21) have been performed, with no significant changes in the main results.

⁶In robustness checks, included in the [Online Appendix](#), the over- and under-representation of certain countries was counterbalanced, applying weights that normalize the samples across countries and survey waves.

⁷The date of the statistics used in this version of the paper is November 2014.

of the total population for the region. For an exhaustive discussion of the SEDLAC data see Bourguignon (2015).⁸ For the main analysis, use is made of the Gini coefficient of disposable household per capita income.⁹ Information on economic growth, measured by GDP per capita in USD (constant at 2005 market prices), and on public expenditures in education are derived from World Bank data (WorldBank 2014). All of the data sources share the great advantage of assuring the best possible comparability between different countries and over time.

3.2 Measurement

The established way to measure intergenerational mobility in a society is to estimate the following equation:

$$Y^t = \alpha + \beta Y^{t-1} + X + \varepsilon, \quad (1)$$

where Y is a measure of permanent income or lifetime earnings for two subsequent generations within a family, and X is a vector of controls. The coefficient β measures the degree of persistence in socioeconomic status from parents ($t - 1$) to children (t). Higher values of β indicate a higher level of association between parents' and children's well being, and thus lower intergenerational mobility, and vice versa.

Outcome variables The information which is most likely to be available in household surveys for both parents and children is completed years of education. In the absence of accurate information on long-run earnings, using education is arguably the best way to identify (lifetime) socioeconomic status since the use of income “snapshots” to approximate (*log*) lifetime earnings leads to serious bias in intergenerational mobility estimates (Nyblom 2016).¹⁰ Furthermore, retrospective information on educational attainment is less affected by measurement error than information on income or earnings. As Blanden (2013) shows with a small sample of countries, intergenerational mobility estimates obtained using educational attainment are highly correlated across countries with the best available estimates using income.

In this study, a comparable measure of intergenerational mobility across countries and over time is obtained through a linear transformation of parents' and children's educational attainments. The two outcome variables $y_{ic}^o = (Y_{ic}^o - \bar{Y}^o)/\bar{Y}^o$ and $y_{ic}^p = (Y_{ic}^p - \bar{Y}^p)/\bar{Y}^p$ indicate the *relative educational position* with respect to the reference group, with Y_{ic}^o being the completed years of education of offspring i in country c , Y_{ic}^p that of her parents, and \bar{Y}^o (\bar{Y}^p) the average years of education of her (her parents') reference group, i.e. people

⁸Most household surveys included in SEDLAC are nationally representative. However, for some countries surveys which cover only urban areas (in Argentina, Bolivia, Colombia, Paraguay, and Uruguay) are also used. In these countries the urban population represents the vast majority of the national population (e.g. 85 % in Argentina). Further computations make the data comparable if derived from different surveys for the same country, and fill missing data points by interpolation; estimates obtained without interpolation are, however, not significantly different to the main results in this study. For further information on methodological issues, see “A guide to the SEDLAC: Socio-Economic Database for Latin America and the Caribbean.” (CEDLAS and the World Bank 2012).

⁹Results do not change when using the Gini coefficient of equivalised household income instead.

¹⁰Studies for the US have shown that proper measurements of intergenerational persistence of income can only be obtained with more than ten years of income spells for both parents and children (e.g. Solon 1992).

of the same age, sex, country, and cohort.¹¹ The outcome variables are centered around 0, which displays the average years of education of people in the reference group. The obtained regression coefficient is thus a measurement which is close to the well-known intergenerational correlation, but has the main advantage of taking into account the inequality in education, a dimension which gets lost if the latter is applied.¹²

The above transformation of completed years of education has several further advantages. First, it offers an intuitive way to evaluate the relative position of parents and children with regard to their reference group, yielding an outcome variable which is more indicative of socioeconomic status than educational attainment alone. Figure 1 shows that the relationship between average relative educational position and different proxy measures for economic well-being is rather similar for different cohorts. For instance, an *average* socioeconomic status assessed by the interviewer is consistently associated with an average educational position around zero (i.e. the average education of the reference group), while the average years of education associated with it varies substantially across different cohorts. Hence, the relative educational position with respect to the reference group should be a more suitable indicator of well-being and socioeconomic status across time than simply evaluating completed years of education. Second, the assumption of linearity is less strong than using completed years of education and the relative educational position is closer to a normal distribution.¹³ Indeed, the transformation yields outcome variables that might be considered continuous, such as income or earnings, instead of ordinal, such as educational attainment. Third, the obtained variable is a measurement of relative standing, and thus conceptually closer to rank-based measures; which in the case of income have been proven to be more robust and less affected by bias (Chetty et al. 2014a; Nybom and Stuhler 2015). It should therefore be an appropriate measure for comparing individuals from different countries and cohorts consistently.

Intergenerational mobility estimates In the first part of the analysis, the following equation is estimated:

$$y_{ic}^o = \alpha + \sum_{k=1}^{18} \beta_k \cdot y_{ic}^p \cdot C_{ic} + \sum_{k=1}^{18} \xi_k \cdot C_{ic} + \sum_{k=1}^{18} \delta'_k (X_{ic} \cdot C_{ic}) + \varepsilon_{ic}. \quad (2)$$

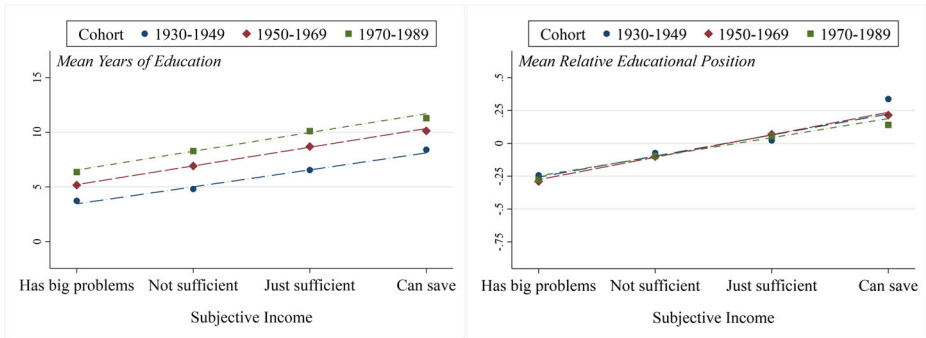
As explained above, y_{ic}^o and y_{ic}^p indicate the *relative educational position* of offspring and parents with respect to the reference group. C is a dummy variable that equals one if i lives in country $c = k$ and zero otherwise; ξ_k thus captures the country fixed effect of

¹¹As usual in the literature, the highest parental degree – or in the case of missing information of one parent, the only one available – is used to measure parental education. Since it would make no sense to compare the parents of people of different sex and age distinctly, the parental educational position is obtained normalizing education only by country and year of birth, assuming that children born in a particular year have parents of approximately the same age. In principle, it would be more accurate to estimate the average of the reference groups for parents by the parent's sex and year of birth. However, the year of birth of parents is not included in the surveys and in Latinobarometro, only the education of the parent with the highest degree is available, without information about whether it is the mother or the father.

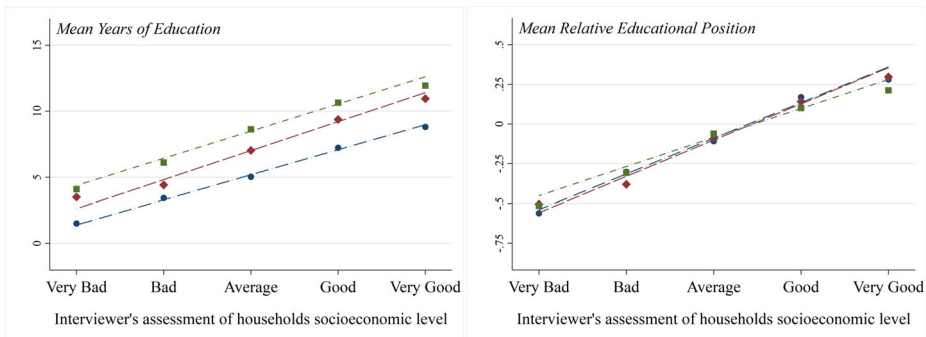
¹²The intergenerational correlation is obtained by multiplying the regression coefficient by the ratio of the standard deviations of parents' and children's outcome and, thus, adjusts for differences in inequality between generations. This is intentionally avoided here since the inequality of human capital is an interesting dimension which should not be taken out of the evaluation. In any case, to provide a comparison with the previous literature, estimates have also been computed i) without any normalization of completed years of education and ii) using the Z-Score of parental education. All estimations confirm the main results and can be found in the [Online Appendix](#).

¹³Further analysis on the linearity and normality assumption can be found in the [Online Appendix](#).

(a) Subjective Income



(b) Interviewer's assessment of socioeconomic status



(c) Number of goods

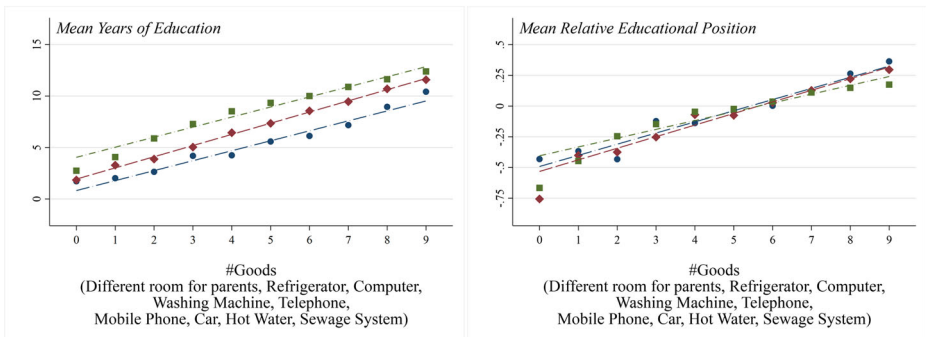


Fig. 1 Educational attainment as a proxy for well being: Years of Education vs. Relative Educational Position. Notes: The graphs show the association between average years of schooling (left) and average relative educational position (right) with different variables included in the Latinobarometro survey indicating well-being or socioeconomic status. The relative educational position is defined as the relative distance of an individual from the educational attainments of his or her reference group, defined as people of the same sex, born in the same year and in the same country. Source: Latinobarometro 2013, own estimations

country k . X comprises individual controls for sex, age (polynomial), and survey year fixed effects. Estimating (2) is equivalent to estimating (1) for each country separately, and yields β coefficients for all of the 18 Latin American countries under evaluation.

Interactions In the second part, macro-level characteristics including inequality, economic growth, and public investment in human capital are included in the regressions to analyze their association with intergenerational mobility. For this purpose, the parental educational position is interacted with these macro-level variables. Formally, the following equation is estimated:

$$y_{ijc}^o = \alpha + \beta y_{ijc}^p + \delta' X_{ijc} + \gamma_Q \cdot y_{ijc}^p \cdot Q_{jc} + \tau_Q Q_{jc} + \gamma_G \cdot y_{ijc}^p \cdot G_{jc} + \tau_G G_{jc} + \gamma_Z \cdot y_{ijc}^p \cdot Z_{jc} + \tau_Z Z_{jc} + \sum_{k=1}^{18} \xi_k \cdot C_{ic} + \varepsilon_{ijc}. \quad (3)$$

Some of the coefficients are restricted to zero in different estimations. A subscript j is added and denotes i 's birth cohort. Equation 3 enables us to evaluate how the relationship between y_{ijc}^o and y_{ijc}^p varies at different levels of the macro characteristics under evaluation. Q_{jc} indicates the level of income inequality experienced by cohort j in country c , measured by the Gini coefficient of household per capita income retrieved from SEDLAC data. G_{jc} indicates economic growth, measured by GDP per capita from World Bank Data. Z_{jc} stands for public investment in human capital, measured by public expenditures on education as a percentage of GDP or by the starting age of compulsory education from World Bank data. Q , G and Z are centered on the sample mean and vary at the country c and cohort j level. Standard errors are clustered by country and year of birth.¹⁴

Since parental income is widely accepted as an useful approximation for parental investment in children, income inequality experienced in childhood can be understood as a proxy for inequality of parental investment in children's human capital, growth as an indicator for increasing parental resources, and public expenditures on education as a proxy for public investment in human capital (see Mayer and Lopoo 2008).¹⁵ The γ -coefficients thus signal a positive or negative change in the slope of the association of parents' and children's socioeconomic status according to the aforementioned characteristics experienced by the individuals.¹⁶

What is of crucial importance is how the macro-level characteristics are associated with individuals of different countries and cohorts. For instance, measuring inequality and intergenerational mobility at the same time (e.g. in the same year) would imply the strong assumption that countries are in steady-state, and within-country differences would not be captured properly. The applied strategy takes these aspects into account, and measures the macro-level characteristics when the individual was at a developmental stage for which investments in human capital were essential, e.g. during childhood or adolescence.¹⁷

The strategy proceeds as follows. First, three lifetime periods are identified when parental (or public) investment in human capital is essential: (A) *Early childhood*, defined as the age

¹⁴Running estimations of Eq. 3 including cohort fixed effects does not change the results significantly.

¹⁵The limitations of this approach for identifying a causal relationship are discussed in the conclusions.

¹⁶A similar methodology was adopted by Mayer and Lopoo (2008) to evaluate the relationship between government spending and intergenerational mobility, and by Schütz et al. (2008) to analyze the effect of certain characteristics of the education system on equality of opportunity.

¹⁷Of course, investment in human capital may be made at every stage of life. However, as shown by many studies, human capital investments are more effective, and have a longer lasting effect, the earlier they take place. See, among others, Ermisch et al. (2012) and Heckman and Mosso (2014) for an overview of the importance of investment in human capital at different moments of children's lifetimes. Hufe et al. (2017) even argue that all achievements and behaviors of children are due to circumstances they should not be held responsible for.

interval from 0 to 6, (B) *Primary school age*, from age 6 to 12, and (C) *Adolescence*, from age 12 to 18. Then, the average of the macro characteristics are matched to individuals born in a particular year according to the country in which they live and the respective age intervals mentioned previously.¹⁸ This method permits sufficient variation in the independent variables, not only between but also within countries. Equation 3 is estimated separately on specifications (A), (B), and (C).

4 Results

4.1 Stylized evidence

Latin America is an interesting laboratory for analyzing inequality and intergenerational mobility. On the one hand, the region is still characterized by high levels of inequality, which are among the highest from a global perspective (Alvaredo and Gasparini 2015; Lustig et al. 2013). At the same time, studies in the past highlighted that mobility in Latin America was very low, as would typically be expected for countries with high levels of income inequality.¹⁹ Unsurprisingly, the only four Latin American countries included in the original Great Gatsby Curve - Argentina, Brazil, Chile, and Peru - are situated in the upper right-hand corner of the curve. On the other hand, most Latin American countries experienced a significant decrease in inequality (Gasparini et al. 2011a), and a substantial increase in intergenerational mobility (Neidhöfer et al. 2018a).²⁰

Although the different countries in Latin American all have similar levels of inequality and intergenerational mobility when compared to developed countries, significant differences can be identified between them. Table 1 shows the estimated regression coefficients of Eq. (2) that measure intergenerational mobility for people born between 1970 and 1995. In a ranking of the countries by their rates of intergenerational mobility, not all the differences between the countries are statistically significant, especially in the middle of the ranking. However, countries at the top of the ranking have significantly higher mobility than countries at the bottom; a pattern also found in earlier studies. Furthermore, in most countries intergenerational mobility varies significantly for people born from 1970 to 1976, 1977 to

¹⁸A very simple example taking inequality measured by the Gini coefficient as a macro-level variable: For an individual born in 1986 in Argentina, the average Gini coefficient in Argentina from 1986 to 1992 is associated with *early childhood*, the average from 1992 to 1998 with *primary school age*, and the average from 1998 to 2004 with *adolescence*. For an individual born in 1987, the Gini coefficients are averaged over the periods 1987-1993, 1993-1999, and 1999-2005, respectively.

¹⁹The past literature on mobility in Latin America has been reviewed by Torche (2014) and includes, among others, Behrman et al. (2001), Binder and Woodruff (2002), Castellani and Lora (2014), Dahan and Gaviria (2001), Daude and Robano (2015), Ferreira et al. (2013), and Gaviria et al. (2007), as well as the work of Hertz et al. (2008), which compares intergenerational mobility trends across countries.

²⁰An alternative measurement of intergenerational mobility, called the Social Mobility Index (SMI) and proposed by Andersen (2003), is included in the SEDLAC data for each year and country in which survey data is available. Brahim and McLeod (2016) provide further evidence using this index that the recent fall in Latin American inequality has been associated with higher social mobility. The SMI, as well as its strength and limitations, are discussed in the [Online Appendix](#). Since the limitations for an analysis of intergenerational mobility probably outweigh the advantages, in the present study own measurements of intergenerational mobility are estimated. In the [Online Appendix](#), the SMI-1 and SMI-2 are reported for the sake of completeness, and generally confirm the pattern of rising social intergenerational mobility in most Latin American countries. A comparison of the SMI with the intergenerational mobility measure estimated in the present study can also be found in the [Online Appendix](#).

Table 1 Intergenerational mobility in Latin America: regression coefficients (β) for each Country

	(1)		(2)		(3)		χ^2
	Cohort 1970-76		1977-85		1986-95		
Argentina	0.313	(0.0224)	0.256	(0.0089)	0.245	(0.0122)	7.144
Bolivia	0.288	(0.0080)	0.246	(0.0134)	0.231	(0.0066)	31.220
Brazil	0.302	(0.0035)	0.249	(0.0074)	0.259	(0.0130)	48.510
Chile	0.354	(0.0183)	0.346	(0.0209)	0.350	(0.0478)	0.094
Colombia	0.298	(0.0099)	0.285	(0.0107)	0.284	(0.0140)	1.167
Costa Rica	0.287	(0.0127)	0.275	(0.0113)	0.225	(0.0146)	11.215
Dominican Rep.	0.240	(0.0157)	0.236	(0.0125)	0.270	(0.0223)	1.803
Ecuador	0.321	(0.0156)	0.308	(0.0108)	0.310	(0.0113)	0.458
El Salvador	0.308	(0.0077)	0.256	(0.0106)	0.230	(0.0119)	35.198
Guatemala	0.360	(0.0349)	0.340	(0.0199)	0.364	(0.0280)	0.589
Honduras	0.310	(0.0122)	0.294	(0.0138)	0.432	(0.0105)	87.027
Mexico	0.244	(0.0086)	0.200	(0.0081)	0.206	(0.0178)	14.795
Nicaragua	0.268	(0.0138)	0.252	(0.0113)	0.334	(0.0158)	18.427
Panama	0.307	(0.0125)	0.297	(0.0132)	0.356	(0.0206)	6.255
Paraguay	0.318	(0.0075)	0.296	(0.0123)	0.163	(0.0314)	23.922
Peru	0.306	(0.0185)	0.267	(0.0055)	0.303	(0.0143)	8.536
Uruguay	0.342	(0.0153)	0.335	(0.0071)	0.324	(0.0153)	0.688
Venezuela	0.206	(0.0081)	0.206	(0.0129)	0.161	(0.0189)	4.963
Demographic controls	Yes		Yes		Yes		
Country fixed effects	Yes		Yes		Yes		
Observations	32799		56423		24998		
R^2	0.259		0.231		0.239		
χ^2	218.18		261.37		431.92		

Notes: Regression coefficients (β) of Eq. 2: own vs. parental relative educational position. Demographic controls comprise *sex*, *age* (*polynomial*), and *survey year*. All estimates are significantly different from zero at the 0.01 level. χ^2 next to country name shows the test value for the hypothesis that the coefficients across cohorts within a country are equal (2 degrees of freedom; critical value 5.991). χ^2 at the end of the table shows the test values for the hypothesis that the coefficients across countries are equal (17 degrees of freedom; critical value 27.587). Source: Latinobarometro 1998-2013, own estimates. Benchmarks: USA (PSID, own estimates) / Germany (SOEP v30, own estimates) '70-'76 0.167 / 0.261, '77-'85 0.233 / 0.385, '86-'95 0.140 / 0.292

1985, and 1986 to 1995. In 13 out of 18 countries mobility is higher in the youngest cohort than in the oldest. The range of the intergenerational mobility estimates in the youngest cohort varies from Venezuela, where an increase of 10 percent in parental education relative to the mean of their reference group is associated with a 1.6 percent increase in the children's generation, to Honduras, where it is associated with an increase of 4.3 percent.

The Great Gatsby Curve for Latin America in Fig. 2 is constructed using the intergenerational persistence estimates of the youngest cohort displayed in Table 1, and the Gini index of disposable household per capita income measured in a period when these individuals were in their childhood (average Gini from 1980 to 2005), retrieved from SEDLAC data. We observe the expected positive relationship between the two variables. The cross-country

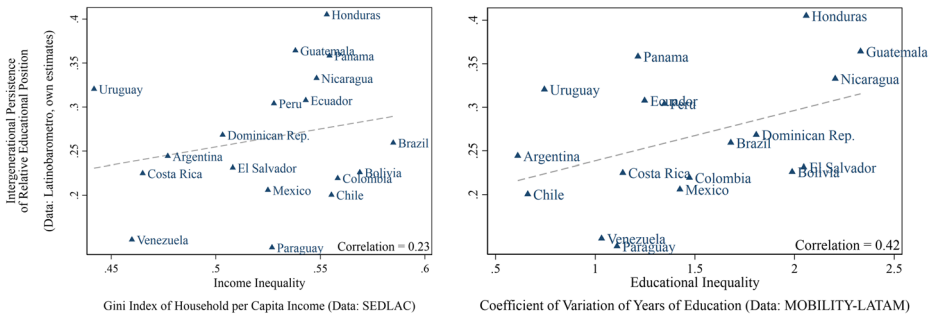


Fig. 2 Inequality and Intergenerational Mobility in Latin America. Notes: The graphs show the stylized relationship between inequality experienced in childhood and intergenerational mobility. Intergenerational mobility is measured by the association between parents' and children's relative educational position of people born between 1986 and 1995 with Latinobarometro data. Income inequality (left) is measured by the average Gini index of household per capita income from 1980 to 2005, retrieved from SEDLAC Data. Educational inequality (right) is measured by the average coefficient of variation of years of education for the cohorts 1940-70, retrieved from MOBILITY-LATAM Data (Neidhöfer et al. 2018a)

correlation is 0.23. The Figure shows also the association between intergenerational persistence and the degree of educational inequality in the parental generation, measured by the Coefficient of Variation of years of education for the cohorts 1940-1970 (retrieved from the MOBILITY-LATAM Data; Neidhöfer et al. 2018a).²¹

This stylized analysis of the relationship between inequality and intergenerational mobility provides a first intuitive overview of the problem. However, these first findings do not allow a rejection of the hypothesis that cross-country heterogeneity is the main force behind the observed differences in inequality and intergenerational mobility, as some authors point out (e.g. Ichino et al. 2011). Hence, the analysis in the following sections will evaluate the effect of income inequality on intergenerational mobility, while adopting a different approach that allows us to control for cross-country heterogeneity.

4.2 Interactions

The methodology applied here and the underlying equations are described in detail in Section 3.2. Table 2 shows the main results of estimating Eq. (3) for the three specifications (A) *Early childhood*, (B) *Primary school age*, and (C) *Adolescence*. The estimates obtained with the Latinobarometro sample are displayed in columns (1) to (4), while the ones obtained with the Harmonized Household Survey sample in columns (5) to (8).

Column (1) and (5) show the baseline estimates of Eq. (3) restricting the coefficients of all the macro-level variables to zero. Then, each specification comprises three different estimations applied on both samples, displayed in columns (2), (3), (4), and (6), (7), (8). The first rows show the average intergenerational mobility parameter β over all countries, at the mean of all the interacted variables with parental educational position, i.e. inequality, growth, and public investment in human capital. The coefficients that display the interaction effect between parental educational position and the characteristics of interest can be found

²¹The MOBILITY-LATAM Data can be downloaded at <http://mobilitylatam.website/>. Applying the Gini index of years of education retrieved from SEDLAC Data yields the same pattern of the relationship.

Table 2 Inequality experienced in childhood and intergenerational mobility

		Harmonized Household Surveys (9 countries)							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Latinobarometro (18 countries)									
Specification (A) Early Childhood									
β	0.260*** (0.0073)	0.256*** (0.0073)	0.257*** (0.0069)	0.243*** (0.0099)	0.243*** (0.0073)	0.241*** (0.0064)	0.241*** (0.0108)	0.274*** (0.0108)	0.204*** (0.0223)
γ_Q		0.192*** (0.0667)	0.142** (0.0719)	0.363** (0.1639)	1.251*** (0.2725)	1.251*** (0.2725)	0.246 (0.4435)	0.246 (0.4435)	-1.189 (1.6530)
γ_G			-0.014*** (0.0039)	-0.013* (0.0072)			-0.027*** (0.0072)	-0.027*** (0.0072)	-0.016* (0.0082)
γ_Z				-0.000 (0.0113)					0.027 (0.0255)
N	33,007	33,007	33,007	15,777	63,843	63,843	63,843	63,843	22,362
Specification (B) Primary School Age									
β	0.256*** (0.0045)	0.254*** (0.0044)	0.252*** (0.0039)	0.250*** (0.0048)	0.254*** (0.0060)	0.253*** (0.0059)	0.259*** (0.0070)	0.259*** (0.0080)	0.259*** (0.0080)
γ_Q		0.130** (0.0651)	0.048 (0.0609)	0.107 (0.0745)	0.877*** (0.2124)	0.877*** (0.2124)	0.734*** (0.2140)	0.734*** (0.2140)	0.833** (0.4030)
γ_G			-0.010*** (0.0022)	-0.010*** (0.0026)			-0.010*** (0.0033)	-0.010*** (0.0033)	-0.010*** (0.0035)
γ_Z				-0.009** (0.0039)					-0.016* (0.0090)
N	62,911	62,911	62,911	53,912	139,610	139,610	139,610	139,610	130,915

Table 2 (continued)

	Harmonized Household Surveys (9 countries)							
	Latinobarometro (18 countries)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Specification (C) Adolescence								
β	0.259*** (0.0043)	0.257*** (0.0040)	0.253*** (0.0036)	0.248*** (0.0033)	0.273*** (0.0059)	0.271*** (0.0061)	0.271*** (0.0056)	0.272*** (0.0042)
γ_Q		0.221*** (0.0701)	0.101 (0.0637)	0.109 (0.0673)		0.873*** (0.2619)	0.797*** (0.2215)	1.681*** (0.2491)
γ_G		-0.009*** (0.0017)	-0.006*** (0.0018)				-0.014*** (0.0028)	-0.008*** (0.0018)
γ_Z				-0.014*** (0.0030)				-0.030*** (0.0064)
<i>N</i>	87,937	87,937	87,937	78,845	203,787	203,787	203,787	195,320

Notes: Table shows the β and γ -coefficients of Eq. (3) for the three different specifications. The specifications reflect three different choices for the age interval ($t_0 \leq age \leq t_1$) when the macroeconomic characteristics are matched to the individual: Specification (A) is the age interval from 0 to 6 years ($0 \leq age \leq 6$); Specification (B) from 6 to 12 ($6 \leq age \leq 12$); Specification (C) from 12 to 18 ($12 \leq age \leq 18$). The macroeconomic characteristics are measured as mean values from year $x + t_0$ to year $x + t_1$ and vary at the country and cohort level. Column (1) and (5) show the baseline estimates without inclusion of the macro-level variables. In all regressions demographic controls (*sex*, *age* (*polynomial*)), and *survey year* and country fixed effects are included. Dependent variable is y^t , i.e. the relative educational position of the offspring, $y^p =$ Parental education, measured by the parental relative educational position. $Q =$ Inequality, measured by the average Gini coefficient of household per capita income (SEDLAC Data). $G =$ Growth, measured by GDP per capita (World Bank Data). $Z =$ Public investments in human capital, measured by the starting age of compulsory education (World Bank Data) in Specification (A), and by public expenditures in education as percentage of GDP (World Bank Data) in Specifications (B) and (C). N is the number of observations. Cluster adjusted s.e. by country and cohort (in parentheses). Statistical significance level * 0.1 ** 0.05 *** 0.01. Source of individual level data: *Latinobarometro* columns (1) to (4), *Harmonized household surveys* columns (5) to (8)

in the next three rows. All regressions include country fixed effects and control for sex, age (polynomial), and survey year.²²

4.2.1 Income inequality

Columns (2) and (6) show that the interaction with income inequality significantly changes the slope in all three specifications, and with both samples. This is strong evidence of a negative relationship between inequality and intergenerational mobility, one which goes beyond cross-country heterogeneity.²³ Furthermore, it might indicate an important role of budget constraints limiting parental investment in children's human capital in Latin America: one of the main reasons for the decline in inequality in the region has been the provision of cash transfer programs to poor families and generally more exhaustive social spending (Gasparini and Lustig 2011b). In addition, it also provides contrasting evidence to the hypothesis of higher intergenerational mobility caused by higher returns to human capital investment, since the increase in inequality in Latin America was also driven by a large fall in the skill premium.

4.2.2 Economic growth & public expenditures on education

It has been theorized in economics that growth increases intergenerational mobility and, furthermore, drives income inequality (among others, Galor and Tsiddon 1997; Galor and Moav 2004; Hassler and Mora 2000). On the other hand, many authors have highlighted the key role of public investment in human capital (among others Benabou 1996; Davies et al. 2005; Solon 2002) and empirically confirmed a positive association with intergenerational mobility (e.g. Mayer and Lopoo 2008). To test these hypotheses, the two features are included in this analysis.

In Columns (3) and (7) growth, measured by GDP per capita, is first included. We observe that the interaction effect of inequality and parental background is still positive, but substantially lower. Furthermore, in some specifications it is not significant; the difference in significance between the two samples might derive by the distinct statistical power and the different countries included in the analysis. The same pattern arises when public expenditure on education, measured as percentage of GDP, is interacted with parental educational position in Columns (4) and (8).²⁴

The coefficients of economic growth and public expenditures on education have the expected negative sign, showing an enhancing effect on intergenerational mobility. These findings highlight one important channel which might be the main driver of the relationship between inequality and intergenerational mobility, namely economic growth. Furthermore, they confirm the power of public investment in human capital to outweigh the lack of private investment. The starting age of compulsory education does not seem to be associated with higher mobility.²⁵

²²The full tables can be found in the [Online Appendix](#).

²³Robustness checks keeping the simply evaluated completed years of education as an outcome variable without any normalization, and normalizing by the Z-Score, confirm the presence of a negative relationship between inequality and intergenerational mobility when controlling for cross-country heterogeneity.

²⁴Conducting the analysis with public expenditure per pupil as percentage of GDP per capita does not change the results significantly.

²⁵The starting age of compulsory education also lacks substantial within country variation in the observation period.

The positive association between growth and mobility, which seems to explain part of the association between inequality and mobility, might be related to the large decrease in poverty in Latin America of the last few decades.²⁶ Since growth has been mainly pro-poor in Latin America, allowing a substantial middle class to arise and hence lowering income inequality (Ferreira et al. 2013), it provides further evidence for the important role of budget constraints. The positive effect of public educational expenditures confirms the findings, among others, of Aizer (2014), Jerrim and Macmillan (2015), Herrington (2015), and Holter (2015) on the importance of public investment in human capital for intergenerational mobility and equality of opportunity.

4.2.3 Robustness

These results are robust to different specifications. First, in the main analysis using the harmonized household survey data, all of the available information on educational attainment of parents and children is used to compute the relative educational position. A robustness check with the same specification as in the Latinobarometro data yields the same patterns. Second, if we restrict the analysis with the Latinobarometro data to the countries for which household survey data is available, the results are very similar in specifications (A) and (B), and differ slightly in (C).²⁷ Third, since the underlying sample is derived by pooling data from different waves of the survey in one case and different waves and countries in the other, the main results displayed above are obtained without using sampling weights. In any case, results obtained using inverse probability weights and weights that counterbalance the differing sample sizes across countries do not differ significantly. Fourth, as a further robustness check, the estimations are performed using both the simply evaluated completed years of education of parents and children, and the Z-Score of one's own and parental education. Using these measures, the evidence of a negative relationship between inequality and mobility is even more striking. Finally, different age restrictions imposed on the sample yield very similar and consistent results.²⁸

4.2.4 Marginal effects

A statistically significant effect of inequality, growth, and public expenditure on education is found in all three specifications. This section now evaluates the economic significance of the estimates. The evaluation of marginal effects shows that intergenerational mobility - i.e. the gradient of parental educational background - varies significantly with relatively sharp shifts in inequality and growth and with moderate changes in public expenditure on education.²⁹

When the Gini coefficient changes by 0.15, intergenerational mobility varies from 9 to 12 percent depending on the specification of the period of life under evaluation. The sharpest change in the slope is observed when measuring inequality in early childhood; i.e.

²⁶The fraction of people in Latin America living under the poverty line fell from about 28 percent to 13 percent from the middle of the 1990s to 2011 (Levy and Schady 2013).

²⁷Performing this robustness check, the only estimation which does not confirm the results of the main analysis is obtained in specification (C) when including economic growth in the regression. Here, the interaction effect of inequality on parental educational position becomes negatively significant (at the 0.05 level). A sensitivity analysis shows that this result is driven by Guatemala, which in fact has the more dispersed distribution of educational attainments in both samples.

²⁸These and other robustness checks can be found in the [Online Appendix](#).

²⁹Graphs and a full table displaying all marginal effects can be found in the [Online Appendix](#).

specification (A). A change in inequality of similar magnitude has actually been experienced by Bolivia and Ecuador. In these countries inequality fell from a Gini coefficient of about 0.6 at the end of the nineties to 0.45 in the late 2000s. In the other Latin American countries where inequality was falling, the change was within a range of 0.02 to 0.1 Gini points.

Changes in economic growth affect intergenerational mobility significantly between 5 and 8 percent of the gradient when GDP per capita changes by 2000 USD. The most remarkable change in the slope is observed, again, for growth in early childhood. The interpretation of this association is more complex because of some contrasting facts. An increase of 2000 USD in GDP per capita is usually a long-run process for a developing country and, since 1970, has not actually occurred in some Latin American countries, such as Bolivia, Guatemala, Honduras, and Nicaragua. For some countries, for instance Brazil and Colombia, this has been a process lasting between 30 and 40 years. In other countries, such as Chile, Costa Rica, and Panama, GDP per capita rose by 2000 USD or more within a decade. Since year of birth varies in the sample from 1970 to 1995, the time horizon comprises 25 years, which might be enough for such a development to take place. Hence, the results point to an economically significant influence of economic growth on intergenerational mobility. As a final remark, the relatively higher importance of economic growth (and inequality) experienced in early childhood seems to confirm that investment in human capital is particularly important during the early periods of life.

The most important factor, aside from private investment in children's human capital, has been theorized to be public investment through the provision of access to education. In the present study, public investment in human capital is measured by public expenditure on education as a percentage of GDP.³⁰ Holding GDP per capita constant, a change in public expenditures on education of two percentage points significantly changes intergenerational mobility estimates by 7 to 9 percent.³¹ At the relatively low levels of public expenditures on education in Latin America, an increase of two percentage points can be a doubling of the efforts in absolute terms. For instance, in Ecuador, Nicaragua, and Uruguay public expenditures on education were around two percent of GDP in the early 2000s. Nevertheless, most countries did indeed experience such a change, especially in the period from 2000 to 2010. Public investment in human capital is thus confirmed to be an important channel to replace private investment and, therefore, to foster intergenerational mobility.

4.2.5 Non-linearities

Figure 3 shows the predicted relative educational position of children from different parental educational backgrounds with rising levels of inequality, growth, and public education expenditures.³² For this analysis of non-linear patterns, parental educational background is now subdivided into three categories of equal population size: *low*, comprising parents with 100 to 30 percent less completed years of education than their reference group; *middle*, comprising parents around the average of their reference group; *high*, comprising parents whose educational attainment is more than about 30 percent higher than their reference group.

³⁰And also by the starting age of compulsory education, which, however, seems to have no significant effect on intergenerational mobility and is therefore not further evaluated in this part of the analysis.

³¹The results do not change significantly if the duration of compulsory education is included as a further control variable.

³²The Figure shows the results of specification (C). The results of the other specifications show the same patterns and are included in the [Online Appendix](#).

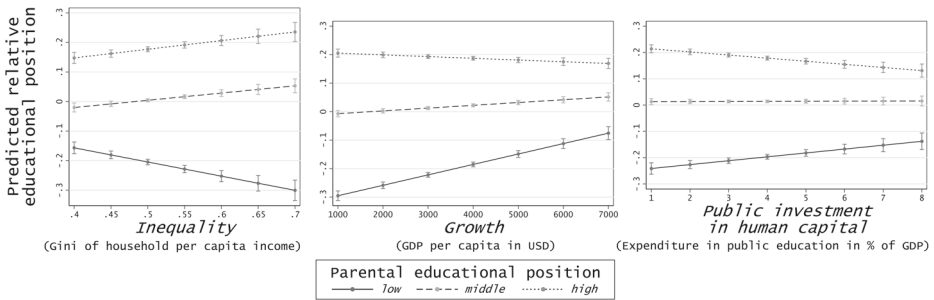


Fig. 3 Non-linearities in the determinants of intergenerational mobility - Marginal effects by parental educational position. Notes: The graphs show the predicted relative educational position of children from different parental educational background with rising levels of inequality, growth and public educational expenditures, as well as the confidence interval (95 %). Equation 3 is estimated subdividing parental educational background into three categories of equal population size: *low*, comprising parents with 100 to 30 percent less completed years of education than their reference group; *middle*, comprising parents around the average of their reference group; *high*, comprising parents whose educational attainment is more than about 30 percent higher than their reference group. These graphs show the results of specification (C) Adolescence. The results of the other two specifications show the same patterns and are included in the [Online Appendix](#)

This analysis shows an even more striking picture and explains the channels of the relationships studied thus far. The patterns of the interaction are clear and consistent in all specifications. The negative interaction of income inequality with intergenerational mobility is particularly strong for families with lower educational positions, while the children of more highly educated parents increase their relative educational position with rising inequality. The same patterns have been found by Cingano (2014) for OECD countries and by Kerney and Levine (2016) for high school dropout rates in the US. The reverse applies to growth and public education: lesser educated families profit most in terms of upward mobility from rising GDP per capita and public expenditures on education.

5 Conclusions

The aim of this study was to test the relationship between income inequality and intergenerational mobility while controlling for cross-country heterogeneity, thus contributing to filling the gap on multi-country and multi-period evidence on this relationship. Using two different sets of harmonized household survey data for 18 Latin American countries, this analysis confirms the negative relationship hypothesized by economic theory and suggested by cross-country evaluations, with the most compelling evidence being the link found between income inequality experienced in childhood and the level of intergenerational mobility in adulthood.

The analysis of different patterns across the distribution shows that the upward mobility of individuals with a low parental educational background is seriously limited by higher levels of inequality, while individuals with a high parental educational background may even improve their relative educational position. In further analyses, economic growth could be identified as one of the main channels behind the relationship in Latin America, while public expenditures on education are an important contrasting force. Indeed, both are positively associated with intergenerational mobility. Since the two sets of micro data used for the analysis include the same countries but are derived from completely different sources – one

from official public institutions and the other from non-governmental sources – obtaining the same patterns with both is strong evidence for the robustness of these findings. It can, therefore, be concluded that a heavily dispersed distribution of (private and public) investment in human capital poses a serious challenge for equality of opportunity within a society.

The present analysis shows that even if institutional background and other heterogeneous effects at the country level are held constant, the negative relationship between income inequality and intergenerational mobility of socio-economic status still persists. As argued above, if parental income is a good approximation for parental investment in children, as is usually assumed in the literature, income inequality experienced in childhood should be a valid proxy for the dispersion of parental investment. At the same time, economic growth should measure increasing parental resources, and public expenditures on education the amount of public investment in human capital (see Mayer and Lopoo 2008). Still, these proxies are imperfect and the exact identification of a causal effect would require an exogenous source of variation in private and public investment in children's human capital.

A methodological contribution of this study is the adoption of a novel way to measure intergenerational mobility of socioeconomic status using a transformation of educational attainment. The sensitivity analyses show that the constructed measure for the relative educational position is highly correlated with income and well-being, performing as a more precise indicator of socioeconomic status than educational attainment. Neidhöfer and Stockhausen (2018b) adopt a similar methodological approach and show that in a cross-country comparison of developed countries, intergenerational mobility measures applying the transformation to parents' and children's educational outcomes indeed mirror past findings on intergenerational income mobility better than measures of educational mobility. Future research will address these points in more detail, using data sets that enable us to construct directly observed measures of intergenerational mobility in income, education, and educational positions, as well as in counterfactual scenarios.

In conclusion, this is one of very few studies analyzing the relationship between inequality and intergenerational mobility in developing countries. The implications should be applicable to developed countries as well, if no other differing mechanisms play a fundamental role. It is left for future research to empirically verify this last remark.

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